

CLAIMS

1. A set of nucleic amplification primers capable of amplifying a V_H - J_H *IGH* rearrangement comprising a forward primer and a reverse primer, wherein said forward
5 primer is selected from the V_H family primers shown in Fig. 3B, or a variant thereof, and wherein said reverse primer is the J_H consensus primer shown in Fig. 3B, or a variant thereof.

2. A set of nucleic amplification primers capable of amplifying a D_H - J_H *IGH* rearrangement comprising a forward primer and a reverse primer, wherein said forward
10 primer is selected from the D_H family primers shown in Fig. 4A, or a variant thereof, and wherein said reverse primer is the J_H consensus primer shown in Fig. 4A, or a variant thereof.

3. A set of nucleic amplification primers capable of amplifying a V_K - J_K *IGK* rearrangement comprising a forward primer and a reverse primer, wherein said forward
15 primer is selected from the V_K family primers shown in Fig. 5B, or a variant thereof, and wherein said reverse primer is a J_K primer shown in Fig. 5B, or a variant thereof.

4. A set of nucleic amplification primers capable of amplifying a V_K /intron-Kde *IGK* rearrangement comprising a forward primer and a reverse primer, wherein said forward
20 primer is selected from the V_K primers or the INTR primer shown in Fig. 5B, or a variant thereof, and wherein said reverse primer is the Kde primer shown in Fig. 5B, or a variant thereof.

5. A set of nucleic amplification primers capable of amplifying a V_λ - J_λ *IGL* rearrangement comprising a forward primer and a reverse primer, wherein said forward
25 primer is selected from the V_λ primers shown in Fig. 6B, or a variant thereof, and wherein said reverse primer is the J_λ primer shown in Fig. 6B, or a variant thereof.

6. A set of nucleic amplification primers capable of amplifying a $V\beta$ - $J\beta$ *TCRB* rearrangement comprising a forward primer and a reverse primer, wherein said forward
30 primer is selected from the $V\beta$ family primers shown in Fig. 7B, or a variant thereof, and wherein said reverse primer is selected from the $J\beta A$ en $J\beta B$ primers shown in Fig. 7B, or a variant thereof.

7. A set of nucleic amplification primers capable of amplifying a $D\beta$ - $J\beta$ *TCRB* rearrangement comprising a forward primer and a reverse primer, wherein said forward
35 primer is selected from the $D\beta$ primers shown in Fig. 7B, or a variant thereof, and wherein said reverse primer is selected from the $J\beta A$ en $J\beta B$ primers shown in Fig. 7B, or a variant thereof.

8. A set of nucleic amplification primers capable of amplifying a V γ -J γ *TCRG* rearrangement comprising a forward primer and a reverse primer, wherein said forward primer is selected from the V γ family primers shown in Fig. 8B, or a variant thereof, and wherein said reverse primer is selected from the J γ primers shown in Fig. 8B, or a variant thereof.

9. A set of nucleic amplification primers capable of amplifying a V δ -J δ *TCRD* rearrangement comprising a forward primer and a reverse primer, wherein said forward primer is selected from the V δ primers shown in Fig. 9B, or a variant thereof, and wherein said reverse primer is selected from the J δ primers shown in Fig. 9B, or a variant thereof.

10. A set of nucleic amplification primers capable of amplifying a D δ -D δ *TCRD* rearrangement comprising a forward primer and a reverse primer, wherein said forward primer is the D δ 2 primer shown in Fig. 9B, or a variant thereof, and wherein said reverse primer is the D δ 3 primer shown in Fig. 9B, or a variant thereof.

11. A set of nucleic amplification primers capable of amplifying a D δ -J δ *TCRD* rearrangement comprising a forward primer and a reverse primer, wherein said forward primer is the D δ 2 primer shown in Fig. 9B, or a variant thereof, and wherein said reverse primer is selected from the J δ primers shown in Fig. 9B, or a variant thereof.

12. A set of nucleic amplification primers capable of amplifying a V δ -D δ *TCRD* rearrangement comprising a forward primer and a reverse primer, wherein said forward primer is selected from the V δ primers shown in Fig. 9B, or a variant thereof, and wherein said reverse primer is the D δ 3 primer shown in Fig. 9B, or a variant thereof.

13. A set of nucleic amplification primers capable of amplifying a chromosomal translocation (11;14)(*BCL1-IGH*) comprising a forward primer and a reverse primer, wherein said forward primer is the BCL1/MTC primer as shown in Fig. 10A, or a variant thereof, and wherein said reverse primer is the JH consensus primer shown in Fig. 10A, or a variant thereof.

14. A set of nucleic amplification primers capable of amplifying a chromosomal translocation t(14;18)(*BCL2-IGH*), comprising a forward primer and a reverse primer, wherein said forward primer is selected from the MBR primers, the 3'MBR primers and the mcr primers shown in Fig. 11A, or a variant thereof, and wherein said reverse primer is the JH consensus primer shown in Fig. 11A, or a variant thereof.

15. A set of nucleic amplification primers capable of amplifying the human *TBXAS1* gene comprising a forward and a reverse primer, wherein said forward primer is the

TBXAS1/X9U primer of Fig. 12 A, or a variant thereof, and wherein said reverse primer is the TBXAS1/X9L primer of Fig. 12A, or a variant thereof.

16. A set of nucleic amplification primers capable of amplifying the human recombination activating protein (*RAG1*) gene comprising a forward and a reverse primer, wherein said forward primer is the RAG1/X2U primer of Fig. 12A, or a variant thereof, and wherein said reverse primer is the RAG1/X2L primer of Fig. 12A, or a variant thereof.

17. A set of nucleic amplification primers capable of amplifying human promyelocytic leukemia zinc finger protein (*PLZF*) comprising a forward and a reverse primer, wherein said forward primer is the PLZF/X1U primer of Fig. 12A, or a variant thereof, and wherein said reverse primer is the PLZF/X1L primer of Fig. 12A, or a variant thereof.

18. A set of nucleic amplification primers capable of amplifying gene the human *AF4* gene (Exon 3) comprising a forward and a reverse primer, wherein said forward primer is the AF4/X3U primer of Fig. 12A, or a variant thereof, and wherein said reverse primer is the AF4/X3L primer of Fig. 12A, or a variant thereof.

19. A set of nucleic amplification primers capable of amplifying gene the human *AF4* gene (Exon11) comprising a forward and a reverse primer, wherein said forward primer is the AF4/X11U primer of Fig. 12A, or a variant thereof, and wherein said reverse primer is the AF4/X11L primer of Fig. 12A, or a variant thereof.

20. A nucleic acid amplification assay, preferably a PCR assay, more preferably a multiplex PCR assay, using at least one set of primers according to any one of claims 1 to 19.

21. A method for detecting a V_H-J_H *IGH* rearrangement, comprising using one or more sets of primers according to claim 1 in a nucleic acid amplification assay according to claim 20.

22. A method for detecting a D_H-J_H *IGH* rearrangement, comprising using one or more sets of primers according to claim 2 in a nucleic acid amplification assay according to claim 20.

23. A method for detecting a V_K-J_K *IGK* rearrangement, comprising using one or more sets of primers according to claim 3 in a nucleic acid amplification assay according to claim 20.

24. A method for detecting a V_K/intron-K_{de} *IGK* rearrangement, comprising using one or more sets of primers according to claim 4 in a nucleic acid amplification assay according to claim 20.

25. A method for detecting a V λ -J λ IGL rearrangement, comprising using one or more sets of primers according to claim 5 in a nucleic acid amplification assay according to claim 20.

26. A method for detecting a V δ -J δ TCRB rearrangement, comprising using one or more sets of primers according to claim 6 in a nucleic acid amplification assay according to claim 20.

27. A method for detecting a D δ -J δ TCRB rearrangement, comprising using one or more sets of primers according to claim 7 in a nucleic acid amplification assay according to claim 20.

28. A method for detecting a V γ -J γ TCRG rearrangement, comprising using one or more sets of primers according to claim 8 in a nucleic acid amplification assay according to claim 20.

29. A method for detecting a V δ -J δ TCRD rearrangement, comprising using one or more sets of primers according to claim 9 in a nucleic acid amplification assay according to claim 20.

30. A method for detecting a D δ -D δ TCRD rearrangement, comprising using one or more sets of primers according to claim 10 in a nucleic acid amplification assay according to claim 20.

31. A method for detecting a D δ -J δ TCRD rearrangement, comprising using one or more sets of primers according to claim 11 in a nucleic acid amplification assay according to claim 20.

32. A method for detecting a V δ -D δ TCRD rearrangement, comprising using one or more sets of primers according to claim 12 in a nucleic acid amplification assay according to claim 20.

33. A method for detecting a chromosomal translocation (11;14)(*BCL1-IGH*), comprising using one or more sets of primers according to claim 13 in a nucleic acid amplification assay according to claim 20.

34. A method for detecting a chromosomal translocation t(14;18)(*BCL2-IGH*), comprising using one or more sets of primers according to claim 14 in a nucleic acid amplification assay according to claim 20.

35. A method for detecting a gene selected from the group consisting of the human *AF4* gene (exon 3), the human *AF4* gene (exon 11), the human *PLZF1* gene, the human *RAG1* gene and the human *TBXAS1* gene, comprising using one or more sets of primers according to any one of claims 15 to 19 in a nucleic acid amplification assay according to claim 20.

36. Use of a method according to claim 35 to assess the quality of a DNA sample extracted from a biological sample, preferably a paraffin-embedded biological sample.

37. A method for detecting two or more rearrangements, two or more translocations or at least one rearrangement and at least one translocation selected from the group consisting of a V_H-J_H *IGH* rearrangement, a D_H-J_H *IGH* rearrangement, a V_K-J_K *IGK* rearrangement, a $V_K/\text{intron-Kde}$ *IGK* rearrangement, a $V_\lambda-J_\lambda$ *IGL* rearrangement, a $V\beta-J\beta$ *TCRB* rearrangement, a $D\beta-J\beta$ *TCRB* rearrangement, a $V\gamma-J\gamma$ *TCRG* rearrangement, a $V\delta-J\delta$ *TCRD* rearrangement, a $D\delta-D\delta$ *TCRD* rearrangement, a $D\delta-J\delta$ *TCRD* rearrangement, a $V\delta-D\delta$ *TCRD* rearrangement, a $t(11;14)(BCL1-IGH)$ translocation and $t(14;18)(BCL2-IGH)$ translocation, using at least two sets of primers according to any one of claims 1 or 14.

38. A method for assessing clonal rearrangements and/or chromosome aberrations using at least one set of primers according to any one of claims 1 to 14, and optionally at least one set of primers according to any one of claims 15 to 19.

39. A method according to claim 38 for the detection of minimal residual disease (MRD) or for identification of PCR targets to be used for MRD detection via real-time quantitative PCR.

40. A method according to claim 38 or 39, wherein an amplified nucleic acid is detected using automated high resolution PCR fragment analysis.

41. A kit for the detection of at least one rearrangement selected from the group consisting of a V_H-J_H *IGH* rearrangement, a D_H-J_H *IGH* rearrangement, a V_K-J_K *IGK* rearrangement, a $V_K/\text{intron-Kde}$ *IGK* rearrangement, a $V_\lambda-J_\lambda$ *IGL* rearrangement, a $V\beta-J\beta$ *TCRB* rearrangement, a $D\beta-J\beta$ *TCRB* rearrangement, a $V\gamma-J\gamma$ *TCRG* rearrangement, a $V\delta-J\delta$ *TCRD* rearrangement, a $D\delta-D\delta$ *TCRD* rearrangement, a $D\delta-J\delta$ *TCRD* rearrangement, a $V\delta-D\delta$ *TCRD*, and/or at least one translocation selected from $t(11;14)(BCL1-IGH)$ and $t(14;18)(BCL2-IGH)$, comprising at least one set of primers according to any one of claims 1 to 14.

42. A kit according to claim 41, further comprising at least one set of primers according to any one of claims 15 to 19.